

Easy to Swallow?

The Commercial Presentation

of Phytoestrogen Research

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Declaration of originality

I declare that the work described in this sub-thesis, unless otherwise acknowledged, is the original work of the author and has not been presented for a degree elsewhere.

A handwritten signature in black ink, appearing to read 'G Goldin', written in a cursive style.

Gregg Goldin

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Abstract

Phytoestrogens are a group of chemicals identified in food. Some of the commercial marketing of these substances claims that taking phytoestrogen supplements could offer the same health benefits as eating an Asian diet. This phenomenon stems from scientific research that has found that phytoestrogens may be responsible for the notable health benefits of ethnic diets that are rich in vegetables. Many modern Western diseases may stem from a lack of dietary factors found in 'traditional' diets. The findings suggest phytoestrogens may reduce the risk of heart disease and some cancers, and possibly alleviate menopausal symptoms. The scientific information about phytoestrogens has added to the barrage of nutrition information already presented to the public.

This study examined how phytoestrogens were presented commercially, including the methods, content and style. The public's response to the presentation of phytoestrogens was investigated and the possible implications this might have for public nutrition education are discussed. Much of the advertising was found to focus on women at, or approaching, menopause and presented a 'natural' alternative to hormone replacement therapies. The marketing campaigns universally included information about studies of Asian populations. Asian epidemiological studies have had an important role in generating scientific interest in the area, and this aspect of the research provided a important foundation on which the advertisements were built.

Some women interviewed for the study found the advertisements compelling and had

purchased phytoestrogen products. Many claimed to be sceptical of nutrition discoveries but were still interested to know whether phytoestrogens might be useful to them. They were aware that nutrition is a complex and multifaceted subject but were not clear on the specific limitations of epidemiological studies. Most of the subjects could identify with Asian studies on phytoestrogens. This aspect of the research provided a reason to take note of these discoveries in an environment where there are conflicting messages about nutrition.

The apparent success of phytoestrogen marketing provides some important lessons for nutrition education. Health campaigners use nutrition education to encourage people to choose a healthy range of food. They work in a difficult environment where people have varied associations with food, there is a great deal of choice for consumers and many food products are presented in an alluring fashion by advertising. To guide the public on what constitutes a healthy 'balance' advocates could use the apparently successful techniques of presenting cultural health associations rather than biochemical when promoting the benefits of the rather unglamorous legumes, or other fruit and vegetables outlined in the Australian Dietary Guidelines.

Table of contents

ii	Declaration of originality	
iii	Acknowledgments	
iv	Abstract	
vi	Table of contents	
viii	List of figures	
viii	List of tables	
 CHAPTER 1: INTRODUCTION		1
Background		1
Rationale for the study		3
 CHAPTER 2: LITERATURE REVIEW		8
Science of nutrition		8
Phytoestrogens		12
Science communication		18
Communicating nutrition		22
Legislative issues		25
Presenting nutrition		26
Learning about nutrition		29
Summary		31
 CHAPTER 3: METHODOLOGY		33
Introduction		33
Methods		36
Investigating marketing		36
Interviews		37
Summary		40

CHAPTER 4: RESULTS	42
Phytoestrogen marketing	42
Printed advertisements	43
Promensil pamphlet review	44
Presentation	44
Other products	49
Summary	51
Public responses	52
Nutritional motivation	53
Food as a nutrient source	56
Information gathering	58
Coping with a technical topic	61
Specific scientific understanding of phytoestrogens	63
CHAPTER 5: DISCUSSION	65
Phytoestrogen science	65
How phytoestrogens are marketed	67
Communication in context	69
Recommendations for nutrition education	75
Limitations	77
Conclusion	78
REFERENCES	81

APPENDICES	92
Appendix 1. Australian Dietary Guidelines	92
Appendix 2. Sources of printed advertising material	93
Appendix 3. Retail outlets investigated	94
Appendix 4. Food with phytoestrogens on labelling	97
Appendix 5. Interview lead questions	98
Appendix 6. Interviewees	99
Appendix 7. Sample interview	100

List of figures

Figure 1.	An example of nutrition jargon in popular culture	2
Figure 2.	Functional food advertisement	5
Figure 3.	The Shannon–Weaver communication metaphor	16
Figure 4.	Cover of the Promensil advertising pamphlet	46
Figure 5.	Page 5 of the Promensil advertising pamphlet	47
Figure 6.	Page 2 of the Promensil advertising pamphlet	48
Figure 7.	Magazine advertisement for Phytolife	50
Figure 8.	Packaging for Soy–Start breakfast cereal	51

List of tables

Table 1.	List of information sources of participants in the interviews	54
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Chapter 1: Introduction

The science of nutrition is relevant to everyone. We all eat. Increasingly, science is finding that some foods seem to prevent certain diseases when included in the diet. This study looks at a group of compounds commonly eaten in the diet which are blurring the boundary between nutrition and pharmacology. It examines how phytoestrogens are presented to the public through commercial marketing campaigns, while viewing the topic within the greater context of public nutrition education.

Background

Plants have co-evolved with humans over millennia. Apart from using them as a food source, many cultures have learnt to eat specific plants to treat and prevent diseases.

Humans are not the only animals to do this. The Brazilian Muriqui monkey, for example, travels to an inconvenient section of its rain forest territory to consume large amounts of the legume *Enterolibium contortiliquim* just before the mating season. The fruit of this plant contains a precursor of progesterone, a crucial female reproductive hormone.

Sapolsky, the anthropologist who made these observations speculates that the legume helps aid the fertility of the Muriquis (Sapolsky, 1998, p.149). Other apes are known to chew medicinal leaves for their anti-parasitic properties.

A problem biologists are still grappling with is that these behaviours develop in an animal colony without apparent formal experiment. Modern science may not be the only method

of investigating or storing knowledge about nutrition. It has been suggested that traditional rituals among indigenous human populations is a learning and storage mechanism for a culture's nutritional knowledge (Lupton, 1994). In other words, culinary development may be thought of as a means to assimilate and pass on knowledge of eating a sustaining variety of foods. This social learning process has developed over time in many different areas of the world.

Industrialisation and mass food production have distanced many people from food growing, processing and even cooking. In developed countries like Australia, marketing presents consumers with information encouraging them to buy a growing range of attractive food products which many people have no tradition of eating. Nutritional education is thought to have an important role in helping people make wise food purchasing decisions in the commercial environment, where people are increasingly devoid of traditional food knowledge (Johnson and Johnson, 1985).

Scientists and educators often focus on providing information on nutrients contained in food, thinking it will help consumers make informed decisions (Johnson and Johnson, 1985). Commercial interests also present information about specific nutrients, as a marketing tool (Campbell and O'Connor, 1988). Examples of marketing such information gleaned from scientific research can be seen in the boom of vitamins and supplements commercially available. As new nutritional components are identified by science it is not long before they are available as a supplement and touted by marketing campaigns as being vital for health. One must wonder how the public can deal with such

specialist scientific information and the growing list of nutrients reported to be necessary for good health, such as 'trans fatty acids', 'complex carbohydrates' or 'antioxidants' (see Fig. 1).

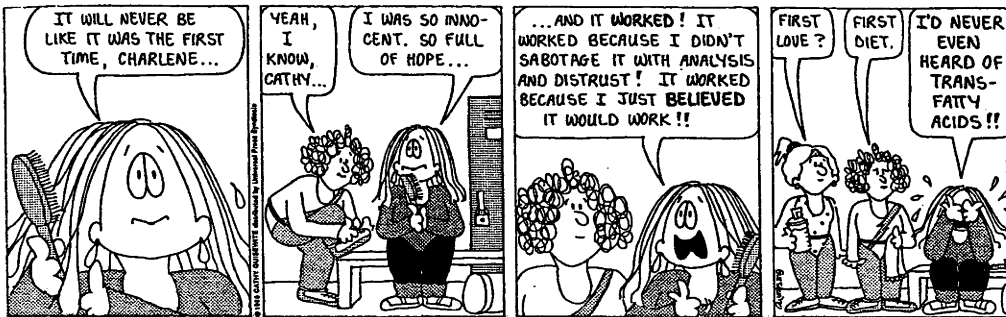


Figure 1. An example of nutrition jargon in popular culture

(Sydney Morning Herald 31 March p. 22).

Phytoestrogens are a relatively new class of substances which are commonly eaten in the diet. They have some physiological effects not normally associated with nutritional substances. Identified through their action of behaving like weak versions of the hormone oestrogen, phytoestrogens may have a big impact on the way we think about nutrition.

Rationale for the study

The explicit health claims for individual food products and nutrients by health campaigners and advertisers have received considerable attention by nutrition educators,

and some are sceptical of whether it is beneficial to present this highly specific information (Campbell and O'Connor, 1988). It is argued that it can confuse or intimidate people, and that it is unreasonable to expect most people to analyse their diets by monitoring the intake of all the new food elements spotlighted by science. Other nutrition educators are worried that the increasing presentation of diet/disease relationships found by science may make people more susceptible to questionable health claims about dietary supplements, even leading to neglecting medical help (Dubick, 1983).

Companies now market many nutrients as separate products or special additives to food. So-called 'functional foods' have been appearing on the US and European markets and Australia is following the lead (See Fig. 2). Functional foods are processed foods defined by a functional ingredient (oligosaccharide, fibres, minerals, etc) that is claimed to perform specific health roles like preventing, treating or curing various diseases (Hunt, 1994).

"All I did was just change his spread and his cholesterol uptake dropped. Talk about easy."



With Flora pro-activ, all it takes to lower your cholesterol uptake is 25 grams a day (about the same amount of spread you'd use on four slices of bread).

You see, not only does new Flora pro-activ have the great taste of regular Flora but it's also enriched with natural Plant Sterols.

Plant Sterols occur in all plants and have been shown to reduce cholesterol from being absorbed into the bloodstream.

And the result? A change for the better, simply by changing your spread.

If you'd like more information about how Flora pro-activ can help reduce cholesterol absorption as part of a healthy diet please call the Flora pro-activ Careline on 1 800 628 400. Or visit us at www.flora.net.au.

FLORA pro-activ

Something worth Spreading.

Figure 2. Functional food advertisement. (Sydney Morning Herald, 16 July 1999, p.9)

By necessity functional foods and supplements will require some form of justification or explanation of scientific worthiness if consumers are expected to pay the high prices of these foods. This additional advertising will add to the barrage of technical information already presented to the public. How the public deals with this information may have implications for public health.

Phytoestrogens are a relatively new class of substance in the public eye, and as such regulatory bodies, societies, and individuals may be having trouble defining exactly what they are; a food, medicine, vitamin or a complimentary medicine? In this study I chose to investigate them as important component of normal food, and therefore a nutrient.

This study investigated some artefacts of commercial phytoestrogen marketing and how they have been received by the public. The study examined concepts which could have relevance for nutrition education by placing the scientific investigation of phytoestrogens in a larger social context.

The research questions specifically addressed in this Sub-thesis are:

1. How have phytoestrogens been presented in commercial marketing, including the methods, content and style?
2. How has the public responded and what are the implications for public nutrition education?

To answer the first question, a comparison was made between the findings of scientific research into phytoestrogens and the ideas presented in commercial marketing.

Assessment of the nature of the commercial presentation was performed through surveys of food packages and advertising materials from magazines and pamphlets.

To answer the second question, additional material was obtained from interviews with twelve members of the 'public' who already had some awareness of phytoestrogens. The interviews discussed perception of general nutrition and specific awareness of phytoestrogens.

Chapter 2: Literature review

Research into nutrition is continually generating a vast amount of scientific information.

Phytoestrogens have gained increasing attention from researchers in recent years.

They have been studied in a similar manner to other nutritional substances. A common approach is to observe subjects or populations, who happen to consume particular substances naturally in their diet, to determine any health associations. The communication of these scientific concepts, such as ‘association’ or disease ‘risk factors’, to the public requires special considerations. There are many difficulties inherent in communicating scientific concepts and nutrition is no exception. The communication of nutrition information has relevance to public health initiatives and to commercial interests who aim to change peoples’ eating habits. The media are an important means by which this information is conveyed and media presentations must be viewed in the context of a consumer society where foods, nutrients, news and even cultural values are being sold as commodities.

Science of nutrition

Nutrition is a science with a long history. Humans have been investigating the role of food in disease since ancient times. Hippocrates said “Who ever gives these things (food) no consideration and is ignorant of them, how can he understand the disease of man”.

Although many of the essential nutrients have been discovered, research is continuing to find new relationships between food and health using a variety of methods of

investigation.

Much of our knowledge of nutrition comes from studying diseases resulting from the lack of dietary nutrients. Egyptians found that eating liver prevented night blindness, and consuming citrus fruits prevented scurvy (Machlin, 1992, p.1). In 1906 the English biochemist Fredrick Hopkins summed up advances in nutritional knowledge by proposing, 'diseases like rickets and scurvy are very likely caused by a lack in the diet of very tiny, even trace amounts of accessory food factors' (Machlin, 1992, p.3). Once science entered the paradigm of 'food factors', it took only 30 years of research into deficiency diseases to identify the thirteen substances recognised today as vitamins. Similar patterns of investigation resulted in the discovery of the role of minerals such as iodine and calcium. As the understanding of human physiology increases, the roles of many of these food components in the body are still coming to light.

Scientific investigation has moved past identifying the essential nutrients for immediate survival and now looks at the role of diet in many chronic diseases such as heart disease, hypertension and cancer (Keys *et al*, 1986). Chronic diseases take many years to develop, so epidemiological studies are a primary method of investigating food/disease relationships—an association between a group of people with a particular diet and the incidence of a disease, or lack thereof, providing the primary clues for further investigation.

Examples of epidemiological studies can be seen with cardiovascular disease. Eskimos

were found to have low incidences of heart disease, raising speculation about the protective nature of a diet rich in fish (Gurr, 1992, p12), and in particular, a type of oil found in the fish. The low incidence of heart disease in southern France has inspired investigation into the possible health benefits of red wine, popular in that region (Grundy and Denke, 1990). Most people eat a large variety of foods and many chronic diseases have multiple factors in their progression, hence epidemiological studies can only find associations between diet and diseases but not show definitive cause and effect.

Nutrition experiments sometimes involve supplementing or exchanging people's diets with a particular food or nutrient. Few trials have conclusively proved the effectiveness of a single food alone in preventing chronic diseases other than specific deficiencies (Campbell and O'Connor, 1988). The long time span over which many chronic diseases develop make the logistics of such trials difficult. The only conclusive results are seen in a reduction of physiological risk factors of some diseases.

Risk factors are measurable conditions which show strong scientific evidence for a role in a disease, such as high blood cholesterol being a risk factor for heart disease. Risk factors act as an intermediary link in deducing the possible long term effects of eating certain foods. For example, some foods are thought to be preventative of heart disease because they can be shown to directly reduce blood cholesterol or decrease the oxidation levels of fat in the blood, both of which have been considered negative risk factors for heart disease (Grundy and Denke, 1990). Although a food's effect on a risk factor is relatively easy to prove, theories may change on whether a particular risk factor is still relevant to a

disease, as appears to be the case with total blood cholesterol, no longer considered of such high importance (Lemonick, 1999).

Increasingly, more specific food components are being investigated by researchers as the means become available. Advances in biochemistry are allowing the substances which make up food to be highly classified. For example, the carbohydrates can further be classified as starches or sugars, and the sugars sub-classified into more specific chemical groups such as monosaccharides or various types of polysaccharides. The same case can be seen again with dietary fats, originally lumped together as one type of dietary component, where as now researchers can distinguish between the many varieties of fats. The vast numbers of new compounds identified in foods are leading to new investigations into their long term health benefits. However, the countless compounds still not identified in foods and the way they may interact when eaten in combination or people with different genetic traits, means that such interventional trials may always remain limited in their value.

One of the most compelling epidemiological findings in nutrition is that people who include a large amount of fruit and vegetables in the diet are less at risk of many chronic diseases including a variety of cancers and heart disease (Keys et al, 1986; Katsuyanni, 1995). In order to understand this general finding, scientists are looking for more specific components which may be responsible. Plants produce a range of chemical compounds called phytochemicals that are under investigation for their health benefits (Lemonick, 1999).

The two main groups of phytochemicals are the carotenoids (beta-carotene is one of the better studied carotenoids, well known for giving carrots their colour) and the flavonoids. So far over 4000 flavonoids have been identified in foods (Miksicek, 1993). They derive their name from the Latin 'yellow'. Flavonoids are compounds chemically based on a phenolic ring structure which give rise to many of the colours seen in fruits and vegetables. Red wine, tomatoes and citrus fruits, for example, get their distinctive colours from flavonoids. The majority of dietary phytoestrogens are flavonoids (Kelly, 1997).

Phytoestrogens

Phytoestrogens by chemical definition cover compounds found in plant based foods which, due to a similarity in chemical structure to oestrogen, can bind with oestrogen receptors in the body (Barrett, 1996). Epidemiological studies produced the primary evidence for the role of phytoestrogens in preventing disease. Techniques for isolating and identifying certain phytoestrogens are giving rise to a number of studies of their actions on the body, from a physiological level down to the molecular level. Recently, clinical tests to see if isolated phytoestrogens can alleviate certain conditions have begun (Hodgson *et al* 1998; Husband *et al* 1998). The investigations have discovered that phytoestrogens may prevent some diseases through mechanisms independent of their oestrogenic action.

Chemists first identified plant compounds with similar structures to oestrogen in the early 1930's, particularly in dates, pomegranates, and soy beans (Price and Fenwick, 1985). It was unknown whether these compounds could exert an action within the body. In Australia a discovery was made which helped link phytoestrogens with a physiological role in animals. Scientists found ewes plagued by reproductive problems were grazing on a species of clover (*Trifolium subterraneum*) and there were high levels of phytoestrogens of the isoflavone class in the sheep's blood (Bennett *et al*, 1946).

Scientists began to question whether these compounds affected humans. It was known that many types of phytoestrogens are present in human biological fluids – blood and urine (Joannou *et al*, 1995) and the concentrations in some people consuming vegetable rich diets could be many times higher than that of normal oestrogen (Barrett *et al*, 1996). The first study to show an oestrogenic action of plant foods in humans was published in 1990 (Wilcox *et al*, 1990). It has since been shown that many phytoestrogens elicit both oestrogenic and anti-oestrogenic responses (Collins *et al*, 1997). The shape of phytoestrogen molecules allow them to bind with oestrogen receptors invoking a weak oestrogenic response, but competing with endogenous oestrogen for the receptor binding sites can create an overall anti-oestrogenic effect known as competitive antagonism.

Primary evidence for the role of phytoestrogens in health came from epidemiological studies. Aldercreutz (1995) notes, in a review of the cancer preventative hypothesis of phytoestrogens, that there are some medical conditions including breast, colon and prostate cancer and heart disease which are far more predominant in Western countries.

Certain populations, particularly Asians, suffer significantly lower incidences of many of these diseases. Studies of Asian migrants to Western countries found that they too adopt a higher risk of these diseases, indicating that an environmental factor, such as diet, may well be responsible (Dunn, 1975; Severson *et al*, 1989). Asian populations have a high dietary intake of phytoestrogens, hence these compounds were a natural target for investigation because many of the cancers are 'hormone dependent' (Aldercreutz *et al*, 1982).

Other ethnic populations with low incidences of hormone dependent cancers were also found to have higher levels of phytoestrogens in their blood (Wilcox *et al*, 1995). Even within ethnic populations the sub-populations of vegetarians who have a high dietary phytoestrogen intake were found to have a lower risk of breast cancer. For example, in Greece, women who had a very high vegetable intake were found to have a ten-fold lower incidence of breast cancer than women with low vegetable diets (Katsuyanni, 1995). An inverse finding was seen in an Australian study where women with clinical signs of breast cancer were found to have lower levels of phytoestrogens in their blood than a healthy control group, standardised for other associated risk factors such as smoking (Ingram *et al*, 1996).

The epidemiological evidence has led to the hypothesis that phytoestrogens in the largely vegetarian, or semi-vegetarian Asian diet may be providing a protective effect (Aldercreutz 1995; Stephens, 1997). One mechanism proposed for their cancer-preventing property is the ability to temper the action of oestrogens over one's lifespan,

reducing the amount and activity of endogenous oestrogen circulating in the bloodstream (Aldercreutz and Mazur, 1997). Western diets high in animal fats and proteins are shown to increase blood oestrogen, which is a recognised risk factor for breast cancer. There is evidence that a Western-type diet elevates plasma levels of sex hormones, as well as decreasing the sex hormone binding globulin concentration, thus increasing the exposure of breast and other tissues to these hormones (Aldercreutz *et al*, 1982). Westerners are thought to be missing out on this “auxiliary oestrogen system” because of reduced consumption of vegetables, whole grains and legumes in diets of post industrial societies (Kelly, 1997).

Although the oestrogen-like action of phytoestrogens has been the initial focus of studies into their health giving effects, it is emerging that these compounds have a multitude of other biochemical activities. Some non-oestrogenic biological properties include the ability to influence the enzymes involved in signal transduction that regulate cell growth and replication, and antioxidant properties (Messina, 1995). The antioxidant role of some phytoestrogens, genistein in particular, has profound implication for the prevention of cancers and heart disease. Studies are now focusing on the potential for phytoestrogens to work directly on destroying existing cancers. The National Cancer Institute in the US is testing genistein for anti-cancer action (Bagnall, 1998). Genistein in particular has been found to inhibit angiogenesis, the proliferation of blood vessels in a cancer’s growth (Zhou and Lee, 1998).

There is much interest in phytoestrogens for the treatment and prevention of prostate

cancer in men. Epidemiological data on prostate disease parallels those findings for breast cancer with a significantly lower incidence in Asian compared to Western countries (Dunn, 1975). Japanese men who migrate to America have an increased incidence of prostate cancer matching that of the local population within one or two generations (Boring *et al*, 1991). Again this suggests a geographic or cultural factor could be responsible for the increase in the incidence of this disease. In its early stages prostate cancer is hormone dependent, and phytoestrogens may act in a similar manner to oestrogen therapy used in some treatment regimes (Stephens, 1997). The main prostatic androgen 5 α -Dihydrotestosterone, vital in the formation and functioning of the prostate, is synthesised from testosterone by the enzyme 5 α -reductase. Lower activities of this enzyme, found in groups of men with low cancer risk compared to men in high risk categories, suggests 5 α -reductase activity may play an important role in the prevention of prostate cancer. Several isoflavones and ligands have been shown to inhibit 5 α -reductase (Evans *et al*, 1995).

There is interest in using phytoestrogens to treat menopausal symptoms as a form of hormonal replacement therapy. Extraction of phytoestrogens derived from soy and other legumes is allowing clinical trials to take place. Promensil, a world leading Australian-manufactured isoflavone phytoestrogen extract, is the most studied commercial plant oestrogen to date (Sharp, 1999). Preliminary results suggest this isoflavone supplement can cause a reduction in menopausal hot flushes (Husband *et al*, 1998), although there are also results showing no greater benefits than a placebo (Woodhead, 1999).

Soy based products are particularly rich in isoflavones, the most oestrogenic of the commonly eaten foods (Messina, 1995). Soy has been the focus of many nutritional trials even before phytoestrogens were the focus of investigation, with many positive results especially in reducing blood cholesterol (Carroll and Kurowska, 1995). Trials supplementing diets with soy have also found a reduction in the frequency and severity of menopausal hot flushes (Albertazzi *et al*, 1998). Eating foods rich in phytoestrogens , like soy, do not appear to have any adverse effects, but the question is raised of whether it is safe artificially to raise phytoestrogen intake through supplement taking.

Examples of phytoestrogen toxicity exist. There are examples in animals where excess levels of phytoestrogens resulted in disruptions of fertility cycles (Barrett, 1996). Long term adverse effects of supplementary phytoestrogens in humans are as yet unknown. No adverse symptoms have been reported in early trials. There is also the notion that exposure to phytoestrogens may need to be long term to have some of the reputed beneficial attributes. Emergent reports from animal studies suggested that to gain some of the anti-cancer effects, exposure to dietary phytoestrogens may need to occur neonatally or pre pubertally (Messina, 1995). With some recent reports finding no effects on menopause symptoms in trials using isolated phytoestrogens, some scientists speculate the benefits may depend on interactions between a wide variety of phytoestrogens or other compounds in grains and cereals (Woodhead, 1999).

The scientific investigation of phytoestrogens is complex, involving many different

researchers around the world, each investigating highly specialised components of the subject. Most of this specialist information is embedded in the scientific language of research papers, making this potentially very important information difficult to convey to the lay public. The problem of communicating such information needs to be considered within a wider framework of science communication in general.

Science communication

“Scientific literacy is becoming an essential requirement for everyday life” proclaimed the Royal Society Report on the Public Understanding of Science in the United Kingdom (Collins, 1987). Scientists have become increasingly specialised within smaller and smaller subject -matter areas (Farago, 1979, p8). Unfortunately the body of knowledge covered by science is enormous and it has become increasingly difficult to convey the latest findings in a manner accessible for the public.

Two different approaches in the field of public science communication have been the attempts increase public understanding of science, and the other to increase awareness. The public understanding approach assumes that a population more proficient in science will overcome communication barriers. The philosophy behind public understanding of science is characterised by science as a formal process with the experts being privileged holders of objective knowledge. This view is criticised for being arrogant, assuming that non experts have no understanding of science. This top down approach to learning has parallels with the linear transfer model of learning. Sometimes also called the

transmission model, it implies a one way flow of information and disregards the active learning process.

The transmission model of communication is sometimes represented as a telecommunication metaphor, suggesting a transmitter and a receiver. It is well illustrated in the Shannon-Weaver model of communication (Fig. 3)

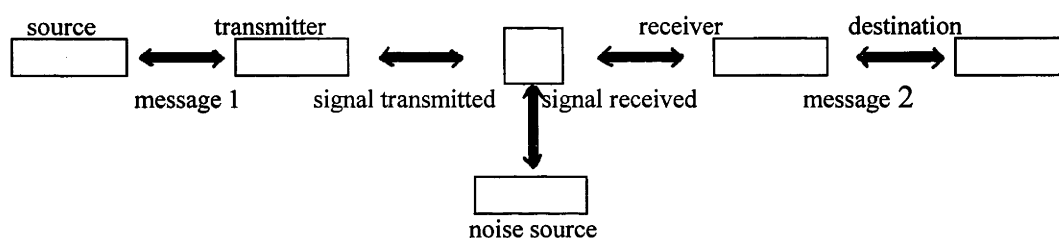


Figure 3. The Shannon-Weaver telecommunications metaphor for communication.

(Shannon and Weaver, 1963, p.98)

Communicators who approach science communication from a 'public awareness of science' perspective differ by taking a constructivist philosophy. The constructivists consider that all learning involves the construction of meaning within the minds of people from previous knowledge and experience (Hawkins, 1994, p10). Teaching does not transmit, or inject knowledge; it facilitates people's construction of their own contextual understanding.

Constructivism de-emphasises transmission in favour of a conversational model of learning. In contrast to the linear transfer model of learning, a constructivist perspective

assumes people to have a more independent self-concept, wealth of prior experience, and a need to know (Knowles, 1970, p55).

The research paper exemplifies communication within the scientific community. The integrity of the research found in these manuscripts is checked by a peer review system, generally considered the crux of quality control in science (Garvey, 1979, p71). Clearly research papers are not designed as a vehicle of information for the general public or even those outside a particular specialisation. Communicators and science journalists generally do not rely on this primary literature of science, rather looking through the various review publications, or meta-analyses which have already placed the new material in some form of context. (Farago, 1976, p44)

The communication of science to the 'lay person' is an area of communication that warrants special considerations. The highly specialist nature of science, and its precise language and jargon, make communication with the public, and even between scientists in disparate fields, difficult. The removal of many scientific concepts from the domain of common human experience hampers public understanding and interest. It has been found that science is better received by the public when it deals with events which at first, or second-hand have a tangible emotional connection to the recipients (Garvey, 1979).

Medicine and the life sciences are highest on the list of scientific issues in which the public take an active interest (Cribb, 1997). This may be due to the obvious interactions we have with these sciences and their professional practitioners. Even so, the public still

has a 'poor' ability to understand health issues presented in the media (Yeaton *et al* 1990).

Science is perceived as difficult by much of the public often stemming from people's experience with science at school. 'The entrenched forces among academic science tend to maintain school science as esoteric and elite knowledge, and resists vigorously the attempts to make it more democratic and meaningful to all students' says Fensham (1998). Scientific jargon is inaccessible to many people and can also further enhance the notion of 'gate keeping' at what the public views as an exclusive club.

Many people have an aversion to what they think of as 'science'. Poor media images of scientists are cited as giving the public negative perceptions of science (Barns, 1989). Typical are the stereotypes of the 'mad scientist' or the eccentric genius with evil intent. There are associations of 'big science' with destructive or unfamiliar technologies like nuclear weapons, toxic pesticides or genetic engineering. These perceptions of science inhibit access to scientific information. The issue is further complicated by perceived conflicts within the world of science.

Conflicts between research findings are an inevitable product of the scientific method. Neither the principles nor the limitations of scientific methods are familiar to the general public, and often the public consider research to be a simple logical process producing unequivocal answers (Collins, 1987, p689). Experts with training many levels above what can be expected of the public's can have radically different opinions on some scientific

issues such as genetic engineering, or the greenhouse. Many members of the public may become confused, or cynical of 'science' when presented with such conflict (Collins, 1987 p690).

Communicating nutrition

The raw findings of scientific research are not suitable or intended for public use.

Government guidelines only present information which is well established, while on the other hand, the news media and advertising are more likely to present newer findings and information specific to certain food products.

Dietary guidelines are published by government bodies in many industrialised countries, including Australia. The Australian Dietary Guidelines (ADG) has been in place since 1983 and are "central to public health nutrition strategies in Australia," according to the National Health and Medical Research Council (NHMRC). The full ADG is presented in Appendix 1. National guidelines cannot afford to present the latest scientific hypotheses, which can be too specific, transient or even incorrect, but must provide a workable framework for public health recommendations.

The ADG provides mostly generic recommendations of what is considered good nutrition practice. Examples include reducing total fat intake and increasing intake of fruit and vegetables. Most of these guidelines are based on evidence suggesting a relationship between a low-fat, high plant-food diet and a reduced risk for cardiovascular diseases.

For the first time specific nutrients were included in the ADG in 1992 that stressed the importance of calcium and iron. Communicating generic notions, such as increasing vegetable intake, can be difficult. For example, a study of 100 Americans found two thirds thought ice berg lettuce and broccoli are roughly equivalent in nutritional content (Spitze, 1983), where lettuce is in fact far less endowed with vitamins, minerals and fibre by weight. However generic messages such as these are all the Dietary Guidelines can afford to promote on the basis of strong scientific findings.

In contrast, commercial messages are not designed to teach people how to purchase the best possible diet, but rather to sell products and are not restricted by the same ethical dilemmas. In order to increase market share, food manufacturers are increasingly using specific and explicit health claims based on particular components in food to promote their products (Campbell and O'Connor, 1988). For example, folic acid is promoted as an ingredient in cornflakes.

These commercial product marketing campaigns are often based on some of the 'latest scientific research'. It seems to make little difference that the text of various scientific reports include cautions that the nutrients must be consumed in the form of food, or that specific levels of intake are only statistical probabilities. Even if the positive effects of a single nutrient are clearly demonstrated in a clinical trial, the application of that information in the public marketplace may not be appropriate given the enormous number of untested and unfavourable interactions existing in the larger, genetically heterogenous, population.

Important differences in the way commercial interests 'campaign' the public in comparison to government sponsored campaigns such as those by the National Heart Foundation are:

- Type of change encouraged: Many government health campaigns aim to change fundamental behaviours, whereas most product advertising aims to mobilise an existing predisposition, as in switching brands. Some advertising also seeks to create new markets.
- Amount of change encouraged: Health campaigns aim to change a large proportion of the population. Product advertisers are usually satisfied with smaller shifts in the market share.
- Time frame of promised benefits: Health campaigns usually ask their target audience to wait for delayed statistical probabilities such as reduced likelihood of eventual illness or a few additional years of life. Product advertisers tend to promise immediate certainty and satisfaction.
- Presentation of the product: Advertisers can dress up their product in an exaggerated fashion. Health campaigners tend to avoid overselling the benefits of behaviours or treatment and the ease of their acquisition (Adapted from Flay and Burton 1990, p.131).

Although doctors are highly trained in their fields, their views on nutrition are coming under scrutiny by nutrition educators (Sobal, 1985). Doctors often work closely with the scientific community and are encouraged to remain receptive to latest research. In Australia, only since 1986 has nutritional instruction been a requisite in medical training, hence many practicing doctors may have had little or no nutrition education as students (Lester, 1994).

Legislative issues

The marketing of nutrients, either as supplements or as ingredients in ‘functional foods,’ has provided some legislative problems. In the US the term ‘neutraceutical’ was proposed for these substances which appeared to lie somewhere between a food and a pharmaceutical agent where the so called functional ingredient could only be included at levels comparable to those already found in the diet (Hunt, 1994).

In Australia, products for human therapeutic use must be placed on the Australian Register of Therapeutic Goods (ARTG) in one of two categories ‘listed’ or ‘registered’. Formulations can be listed for a small fee if they contain substances regarded by the Therapeutic Goods Administration (TGA) as being of low public risk and comply with the Therapeutic Goods Advertising Code. This restricts wording of claims to ‘assist’ rather than ‘treat’ and limits indications to minor self-limiting conditions.

The TGA specifies that no non-prescription products may claim to help or even mention or infer a range of serious health conditions including cancer (except sunscreens).

Advertising of any vitamin or mineral supplement must be accompanied with 'may only be of assistance if dietary intake of (substance name) is inadequate'. This implies that no conclusive evidence for the role of dietary supplements has been scientifically proven other than in preventing deficiency diseases.

The phytoestrogen supplement made by an Australian pharmaceutical company Novogen is ARTG 'listed' product, which means it fits the same category most so called 'complimentary medicines' (Novogen, 1999).

Presenting nutrition

There are a variety of different ways people can be exposed to nutrition information. The way nutrition is presented can differ profoundly depending on the motives behind the presenter. The media is consistently found to be one of the most important means by which the public receive nutrition information.

Some sources from which the public obtain 'useful' nutrition information include books, doctors and informal sources such as family and friends. The media are unanimously cited by the public as their main source of nutrition information (Lambert-lagace, 1983; Krinke, 1990; Radimer and Harvey, 1995). Demographic differences are found in the sources people value. For example, more men than women report TV as an important source of information. Women are more likely to value magazines, friends, alternative

health practitioners and health food stores (Radimer and Harvey, 1995). The majority of these studies have been carried out by asking the members of the public. The public's strong recognition of the media as a useful information source does not imply that it actually changes eating habits. None the less the media must be considered an important means by which people are encountering or adding social context to nutrition information. It is certainly one of the important ways the public is coming into contact with the latest findings of research (Lupton, 1994; Yeaton *et al* 1990)

Analysis of media images of science and technology needs to recognise that such images are embedded within a more general media discourse shaped by the media institutions, and ultimately, society (Williamson, 1978, p 13). There are claims by various cultural analysts who argue that the predominant function of the media in a capitalist society is to reinforce a market commodity of consumer culture, and that science has been drawn into this process (Barns, 1989). As a market-industrial economy expands, more elements both of the natural environment and human qualities are drawn into the realm of exchangeable things. Karl Marx expresses this process in *Grundriss* (in Williamson, 1978) "...to the point where the commodity appears double in real exchange: as a natural product on one side, as exchange value on the other." As many natural elements take on a secondary existence as commodities they are free to be recontextualised with new cultural meanings, through advertising (Lupton, 1994).

Advertising can be considered the form of communication which typifies consumerist culture (Barns, 1989). In advertising the complexities of science are frequently

represented by replacement signs, which transform objects of “nature” into easy-to-digest commodities (Leiss, 1986 p. 243). The media in, presenting these commodities, more than just providing an information service, is continually associating objects and services with central social and cultural meanings. Advertisements, and all other aspects of media images, can be considered to be trading in, and exploiting the metaphysical item called culture (Barns, 1989). Science itself is a cultural process.

Advertising analyst, Williamson (1978, p.41), describes a common phenomenon in advertisements where nature is transformed in a ‘cooking’ process. Imagery is used where the natural item is transformed through advertising to be replaced symbolically by the product. For example, an advertisement for a vitamin supplement featuring a photograph of an orange peel placed next to the product, was described by Williamson as classic case of ‘cooking’. The imagery suggesting that the product and the orange were equivalent, or that one had transformed into the other. ‘Nature’ is essentially the source of all goods, and advertising frequently relies on the strong associations many people have with nature and purity or health (Williamson, 1978 p. 37).

Some research into the public understanding of nutrition science has investigated what nutritional facts are known—a public understanding perspective (Johnson and Johnson 1985). In health surveys, it is clear that a large proportion of the Australian public is aware of at least some of the nutrition advice promoted in the Australian Dietary Guidelines. Public survey respondents often mention reducing fat, salt and sugar intake, three nutrients addressed in the ADG, as the most important problems in the Australian

diet or their own diet in particular (Wosely, 1985). Less consistent is the recognition of the importance of decreasing energy intake and increasing fibre and complex carbohydrate consumption that is also mentioned in the ADG. In addition there seems to be an overemphasis on the importance of vitamins, minerals and dietary cholesterol, all nutrients not given major considerations in the ADG.

People seem aware of the general importance of diet to some chronic diseases.

Knowledge of specific diet/disease relationships tend however to be inaccurate (Crawford and Baghurst, 1990). Most people could not name major causes of mortality in Australia nor the nutritional factors that are implicated in those diseases. Amongst American men similar patterns of misunderstanding were found (Spitze, 1983). He suggested this de-emphasis of the role of nutrition in disease and mortality may be attributed to media overemphasis of accidents and alcohol-related deaths.

Learning about nutrition

It appears that nutrition educators are moving towards a more constructivist approach to educating the public to make nutritionally sound decisions, by acknowledging people's different learning processes. They are moving away from research into what individuals don't know in order to provide them with more information. Making information available does not mean that consumers will use it or make wise decisions (Johnson and Johnson, 1985). The new paradigm is a shift to understanding the socio-cultural context of health-related knowledge and to examine some of the dominant factors shaping

peoples personal and social identities and lifestyle choices.

From a communications point of view the media is not viewed through a 'hypodermic syringe model' of media effects, which represents consumers as passive dupes of 'brain washing techniques' (Lupton 1994). The view that nutrition knowledge and attitudes will determine nutrition behaviour oversimplifies the complexity involved in food selection, preparation and consumption, which is often firmly embedded in cultural practices.

Increasingly in capitalist societies, people are creating their cultural identities based on media images of the commodities they consume; the cars they drive, the clothes they wear, the alcoholic beverage they drink and the food products they consume (Liess, 1986, p243)

Two broad categories which can be used to evaluate the potential effect of media nutrition messages on consumers are stimulus characteristics and consumer characteristics (Moorman, 1990). Stimulus characteristics cover features such as format and content of a piece of information. Consumer characteristics include all the individual differences among those receiving the information; enduring interest in health and nutrition information, prior nutritional knowledge and other demographic factors such as level of education, and age. For example, in a study of the influence of food packaging labels on food choice, it was found that people who had high blood pressure were more likely to look for sodium content, and those with high cholesterol were more likely to look for saturated fat on the labels (Kreuter, 1997). This so called 'need to know' also creates a strong incentive in learning activities (Fensham, 1998)

An example of an external stimulus characteristic important in motivating consumers to process nutrition information is 'consequence information' (Moorman, 1990). It can be defined as information about the relationship between product-level attributes or brand-level attributes (nutritional attributes in this case) and consumer consequences (Gutman, 1982). What is more, if consequence information, particularly negative, is arousing, people are able to process nutrition information and make better choices, even without adequate comprehension.

Summary

Having discovered the essential vitamins and minerals, nutrition research also looks for long term relationships between food types and health by using epidemiological data. Clinical trials and *in vitro* tests are used to investigate the biochemical factors that may be responsible for these relationships.

Phytoestrogens are a group of plant derived compounds, which may be in part responsible for the notable health benefits of a diet rich in vegetables, such as a reduced risk of heart disease and some cancers. Their name is derived from acting weakly like the hormone oestrogen, but they are implicated in having numerous other actions in the body. There is interest in using phytoestrogens as a form of oestrogen replacement therapy.

Phytoestrogen research is relevant to much of the population, but as a complex scientific

process there are many difficulties in making the information accessible to everyone. The communication of science to the public frequently runs into problems with negative attitudes and abilities to relate to the conflicting or technical nature of scientific information. Attempts to facilitate public science learning are increasingly focusing on aiding people to actively learn themselves by using personally meaningful references. This 'constructivism' approach to science communication can help people re-embrace science, having been turned away from it at school.

The communication of science is an important component of nutrition education that aims to change eating habits. National dietary guidelines issued by the National Health & Medical Research Council aim to guide people to choose healthy diets based on current scientific understanding. Companies that sell food and supplements sometimes present the findings of nutrition research in advertisements when making claims about the health giving benefits of their products. Government regulations restrict advertisements from making claims about the direct effectiveness of a food or complimentary medicines if clinical testing has not substantiated them.

The media is found to be the most important means by which the public are exposed to nutrition education and much of this arises through the commercial advertising of food and supplements. Advertising, with its goal to sell specific products may distort the view of current known 'best practice' in nutrition science because of the multitude of mixed associations presented.

Chapter 3: Methodology

Introduction

This chapter firstly describes the methodology - the theoretical analysis of the methods used, followed by the actual methods used to investigate the research questions:

1. How have phytoestrogens been presented in commercial marketing, including the methods, content and style.
2. How has the public responded and what are the implications for public nutrition education?

a case study approach was used. In a case study the researcher explores 'a single entity or phenomenon bounded by time and activity, such as a program, event, process, institution or social group' (Yin, 1994, p10). Information is collected using a variety of procedures. The presentation of phytoestrogens is an interesting case in its own right but may also be reflective of the modes of presentation of other nutrients to the public and therefore is investigated within a nutritional and social framework. The two research questions were investigated by looking at advertising material, and interviewing members of the public who had been exposed to phytoestrogen information. The research method was qualitative in nature.

Sociological research methods are often divided by either a quantitative or qualitative

paradigm. Quantitative research has its roots in positivist thinking, and is characterised by the experimental or empiricist approach (Creswell, 1994). Quantitative researchers attempt objectively to observe reality as something independent of the researcher. Steps are taken to maintain distance and minimise bias.

Qualitative research, which follows a more constructivist philosophy, believes that the only reality is that constructed by the individuals involved in the research situation, whereas the quantitative method of research requires a deductive form of logic, where theories and hypotheses are tested. The qualitative investigation uses an ‘inductive form of logic’ where categories emerge from informants, rather than being identified *a priori* by the researcher (Creswell, 1994). The emergence of categories can lead to theories which help explain a phenomenon.

Interviewing is a standard practice in social research for collecting qualitative data (Holstein and Gubrium 1995; Yin, 1994; Marshall and Rossman, 1995). Although highly structured interviews are often used for quantitative research purposes by attempting to obtain objective facts by removing observer bias, less structured interviews are more qualitative in nature. The qualitative interview should also be considered from an epistemological perspective—the researcher and subject both interact with each other, and it is impossible to separate the two as entities (Holstein and Gubrium 1995, p16). A qualitative interview is sometimes described as a “conversation with purpose” and recognises the interviewer’s involvement. The question of accuracy and validity in this kind of qualitative research is addressed by using a variety of sources or methods, or

“triangulation”.

Triangulation is a means of optimising the quality of data collected in qualitative research by approaching the problem from multiple angles – methods, data sources and researchers (Campbell and Fisk, 1959). The original assumption was that by using triangulation the results would converge and negate bias.

Mathison, however (1988, p13), argues that triangulation is not about reducing bias or improving validity. She argues that convergence will not occur, following the observation of the inability of large groups to form a consensus. The assumption that triangulation will reduce bias is not consistent with a constructivist perspective, in which multiple methods and researchers are likely to produce divergent data due to the different contexts. Mathison proposes an alternative conception of triangulation whereby inconsistency and divergent results are accepted, and the diversity and richness of meaning is teased from this without having to find a single proposition.

Triangulation in this study is therefore not a ‘technological solution to a data and analysis problem, it is a technique which provides more and better evidence from which researchers can construct meaningful propositions about the social world’ (Mathison 1988, p.15). In this study multiple methods were used to narrate the phenomenon of phytoestrogens in the public domain. The review of scientific literature on phytoestrogens provided a scientific perspective, analysis of media artefacts again help to broaden the picture and interviews provided the richest data from the perspective of the

public.

A large sample size is an important tool for evaluation in quantitative studies, to allow generalisations of a quantitative or “scientific” nature. The inability to make broad statistical observations is a common criticism of case study research (Yin, 1994, p10). Case studies, like experiments, can be generalised to theoretical propositions and not to populations, or universes. Sless (personal communication, 1998) supports the belief that case study research in groups as small as six people can yield useful generalisations that identify problems or uncover issues for further investigation more. This method can be more rewarding than using a quantitative ‘wide and shallow’ survey.

Methods

Investigating marketing

The methods used to investigate how phytoestrogens are being marketed involved analysing some of the products of advertising. Promotional materials featuring phytoestrogens were collected from several sources and classified in three major categories: printed materials in magazines (appendix 2), promotional pamphlets for supplements, and information on food packaging (appendix 3). Representative examples of these forms of presentation were analysed semiotically (Altheide, 1996, p.12).

Documents collected were analysed as artefacts of public communication of phytoestrogens.

Product packages for analysis were sourced from health food shops, chemists and the Woolworths supermarket chain. The Woolworths search was included to establish the prevalence of these products available. It is Australia's largest grocery retailer, which stocks the same core products throughout its outlets. The large size of the supermarket outlets meant the search was focused towards food products which are well known to be rich sources of phytoestrogens, which include foods containing soy, legumes, wholegrain and linseed.

Interviews

To investigate the second research question: "how is the public responding, and what are the implications for public nutrition education?" interviews were used to obtain public opinions which could be compared with evidence from the literature reviews on science and nutrition communication.

The interview method employed in this study followed a general guided approach (Marshall and Rossman, 1995, p.80) where a few pre-determined questions help to uncover the interviewee's perspective, but otherwise the approach respects how the participant frames and structures the response. The initiating questions used in the interview are outlined in appendix 5. Further questions and responses were used to encourage respondents to elaborate or reveal other interesting concepts.

Conveying an attitude of acceptance with the interviewees is considered one of the most important aspects of the interviewers approach (Marshall and Rossman, 1995, p.80). The

interviewees were informed that the interview was to be used only for this sub-thesis. It was emphasised that I was not testing them on their knowledge; rather my main interest was in how they were finding out things and ‘opinions’ they had on the subject. To maintain rapport with the subjects, notes were not taken at the time, instead the interview was tape recorded, to allow a natural conversation style. The interviews were later transcribed for analysis. Permission was asked for the interview to be taped prior to commencing the interviews.

A focused approach was taken in selecting subjects for this study. All subjects interviewed had in some way already heard something about phytoestrogens and were willing to discuss the topic. Twelve women between the ages of 45 and 60 were interviewed in this study. Although investigations suggest phytoestrogens may be beneficial for all people of all ages and gender, preliminary investigation of phytoestrogen supplement marketing appears to target women over 45 years of age.

Studies of nutrition education have found increased levels of interest and knowledge in people with higher socio-economic status. For this reason, six of the women interviewed were targeted from this group. These six interviews took place at a tennis court in Mosman, Sydney, where the women were from the local area classified in the highest quintile of the Australian Bureau of Statistic’s Socio-Economic Indices for Areas (SEIFA) for 1995. The environment also provided a relaxed and informal atmosphere for interviewing between games and their interest in tennis suggests some inclinations towards a healthy lifestyle. All women interviewed were social and not professional

tennis players.

Another six women were selected from shoppers at a large Sydney shopping centre in North Ryde, Sydney located in the second highest quintile of the SEIFA socio-economic scale. An awareness survey was also carried out at the shopping centre to provide some indication of awareness of the term 'phytoestrogen' and provide an initial contact for inquiring about a further interview. At a convenient thoroughfare 50 women were randomly asked if they had heard of the term 'phytoestrogen' and asked to indicate to indicate their age bracket. Those who were willing were invited to sit down at in a public location for a full interview.

The interviews were analysed and the information coded into 5 main categories:

- nutrition motivation; identifying motivational factors in nutrition, and relevance this might have on receptivity to phytoestrogen supplements;
- information sources; sources of valued nutrition information and sources which had provided information about phytoestrogens;
- food and nutrients; thoughts about individual nutrients in food and considering the phytoestrogen content of food;
- coping with complexity; dealing with the 'scientific' aspect of nutrition and the many

variables;

- phytoestrogen understanding; analysis of understanding of phytoestrogens in the sample group.

Summary

The research questions about the phytoestrogen phenomenon were investigated largely through qualitative methods which aim to make observation specific to the problems as viewed by the researcher. The quality of the data collected is enhanced by triangulation, which does not necessarily result in a unified answer but a more comprehensive one.

The first research question, which asks how phytoestrogens are marketed, was answered by analysing the content of magazine advertisements, pamphlets, and food packaging that feature phytoestrogens. A supermarket survey searched for products that include phytoestrogen content in their labelling

To address the second research question the public's opinion was sought through selective interviews with 12 women who already had some exposure to phytoestrogen information. The interviews were guided by a questionnaire but were open in their approach to allow elaboration of any areas of interest. In order to put in context the phytoestrogen knowledge of the interviewees with other aspects of their nutritional inclinations, the interviews were used to ascertain nutrition motivation, the information sources valued, thoughts on 'nutrients' and how they deal with the complexities of the

information.

Chapter 4: Results

Phytoestrogen marketing

How have phytoestrogens been presented in commercial marketing, including the methods, content and style? The findings looked at two categories of products that use the science of phytoestrogens as a selling point. There are products in which phytoestrogens are sold as dietary supplements and the other category included foods which contain phytoestrogens either naturally or through enrichment

Three brands of supplements marketed specifically for their phytoestrogen content were found in many health food shops and chemists in Sydney. 'Promensil' contains isoflavones isolated from red clover (*Trifolium pratense*) and is produced by a Sydney pharmaceutical company, Novogen. The company also makes a product aimed at men, 'Trinovin', which is identical in formulation to Promensil. Promensil is the longest standing supplement marketed as a 'phytoestrogen' product in Australia. In 1997-1998 Novogen sold \$3.7 million worth of the supplement Promensil in Australia and New Zealand, mainly through chemists and health food stores (Novogen annual report, 1998). All three supplements provided information pamphlets at many points of sale. Promensil appeared to have the most visible exposure at the point of sale at the retail outlets noted in Appendix 3, and several chemists had large posters, cardboard display units and large model boxes of the product.

'Phytolife' is a concentrated soy bean product rich in isoflavones, produced by

Sydney based supplement manufacturers Blackmores, available as both a capsule and a powder form. It is not strictly a purified phytoestrogen, but being a whole soybean extract it is marketed as a phytoestrogen supplement.

‘Phytobalance’ is a newer supplement tablet containing isoflavones extracted from both soy and Red clover, marketed by Bullivants, a supplement company in Virginia, Queensland.

Some foods claimed to have phytoestrogens in them through advertising or displayed the information on product packaging, both being elements of marketing. The supermarket survey of food packaging looked at the number of foodstuffs that had phytoestrogens mentioned on the packaging material (Appendix 4). Breads were the largest group of foods to use ‘phytoestrogen’ on their packaging, with many of the major brands producing a Soy and Linseed variety. These so-called ‘functional breads’, which also include breads with added folate have apparently helped to revitalise bread sales in Australia (Skelly, 1999).

Printed advertisements

Information pamphlets provide the most detailed information of the printed promotional materials collected (Appendix 2). The pamphlet for the Promensil supplement is particularly interesting because it is the only product consisting of isolated phytoestrogens alone. Pamphlets for supplements based on soy also mentioned additional scientific

evidence suggesting other benefits of soy, some of which may be independent of phytoestrogens, such as lowering blood cholesterol or maintaining bone density.

Promensil pamphlet review

Presentation

Figures 4-6. The presentation on the cover of the Promensil pamphlet mixes natural imagery of a Red clover flower, the source of the phytoestrogen with a molecular motif of a phytoestrogen. The inner pages include graphs and tables furthering the scientific imagery (Fig. 4). The final image on the brochure shows an image of the product itself—a picture of a Promensil box and the tablets sealed in pharmaceutical-style blister packaging (Fig. 5). The box has a picture of the identical red clover flower from the pamphlet front. The logo ‘Promensil’ is printed throughout the pamphlet in a coloured letters with a pink and green transition, mimicking the colour scheme of the red clover.

The imagery is consistent with a ‘cooking’ process described by an advertising analyst Williamson (1978, p.41), where the natural item is transformed through advertising to become replaced symbolically by the product. Here the phytoestrogen tablet represents a healthy clover flower with its association with the natural world. Science in this case, or at least the image of science, is the cooking process which connects the natural item to the consumer product.

Content

Paramount to the scientific ideas presented in the pamphlet was ‘research showing

women in communities who consume high levels of legumes containing isoflavones manage menopause with few symptoms.’ This includes Asian, Latin American and Mediterranean populations with ‘traditional’ diets. To cover the basic concept of menopause, a graph shows how serum oestrogen falls with age (Fig. 6).

Further clarification is made of the quantity and quality of the phytoestrogens being consumed by the communities eating the traditional diets rich in phytoestrogens.

The pamphlet explains the variety of isoflavone type phytoestrogens eaten in these diets, and focuses on “the four important dietary isoflavones”. These four isoflavones, also found in Promensil, are mentioned by name (genestein, daidzein, biochanin A and formononetin) and a tabular representation demonstrates how this preparation, unlike other food sources, has all four isoflavones.



Figure 4. Cover of the Promensil pamphlet showing a Red clover, source of the product.



**Dietary isoflavones for managing
the symptoms of menopause naturally**

Promensil, made from red clover, is an advanced dietary supplement developed especially for women over 45. It is specifically indicated for managing the symptoms of menopause naturally. Promensil contains the four important, natural isoflavone plant hormones that are absent from the typical Australian diet. Promensil is available in a convenient single daily tablet.

Available from pharmacy and health food outlets throughout Australia and New Zealand.

Figure 5. page 5 of the Promensil pamphlet showing the packaged product with its symbolism of the natural source.

Promensil... based on red clover

Promensil is derived from the legume red clover. Red clover has a high isoflavone concentration compared to other plants. Red clover contains the 4 important dietary isoflavones that are present in typical diets of Asian, Latin American and Mediterranean communities. Promensil has been developed to supplement our diet by closely mimicking the isoflavone intake of these communities. Foodstuffs such as soy contain lower concentrations and only 2 of the 4 important dietary isoflavones.

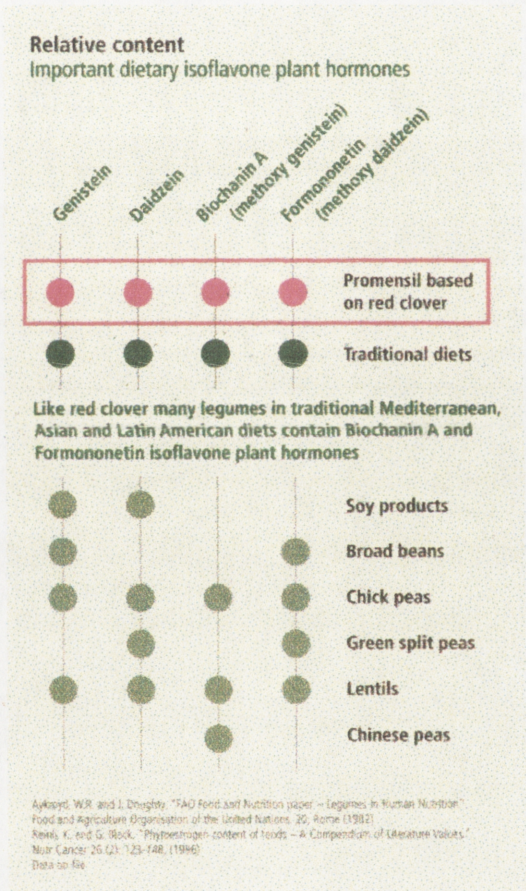


Figure 6: Page two of the Promensil pamphlet, showing how the product emulates the phytoestrogen profile of a ‘traditional’ diet.

The ‘scientific’ procedure in the manufacture of Promensil is stressed. Outlined is the standardisation of isoflavone content in each tablet, “the strictly supervised growing conditions” of the clover.

Other products

Phytolife, the other phytoestrogen supplement found in all the health stores and chemists visited, often had an accompanying pamphlet about soy, although the product’s name was never explicitly mentioned. This pamphlet places emphasis on phytoestrogens as “nature’s hormone replacement therapy” and presents the “facts” that Asians have “had a diet rich in soy for thousands of years” and suffer from fewer menopausal symptoms. The presentation emphasis here is on the benefits of soybeans as a well trusted (by Asian culture) natural product. Figure 7 illustrates a magazine advertisement for the same product using the positive angle of cultural association, to emphasise trust, as well as the conflicting notion of the ‘unfamiliar’ in exotic foods.

Again natural imagery is used in the Blackmore’s brochure with pictures of whole soybeans in the pod. The final product is not stressed but Asian writing provides symbolism of the Asian culture which has supposedly embraced the soy bean for so long. Presentation of soy based supplements, including Phytolife, were also able to allude to reducing cholesterol and maintaining bone density, both properties of soy but not isolated phytoestrogens.

Relieves menopausal symptoms

Ditto

Unlike Western women, most Asian women rarely suffer from the symptoms of menopause. In Japan, for instance, there isn't even a term for 'hot flushes.'

New research shows that the answer may lie in the Asian diet as soy-rich foods such as tofu contain natural plant hormones called phytoestrogens.

Most Australians eat very little soy, so Blackmores have developed PhytoLife™ 1 Special Formula Soy Concentrate.

Just one small tablet a day gives you all the phytoestrogens of a soy-rich diet to relieve the symptoms of menopause.

If eating 120g of tofu every day is about as appealing to you as a hot flush, pick up Blackmores PhytoLife™ 1 at your pharmacy or health food store.

BLACKMORES
PHYTO LIFE ONE A DAY
Special Formula Soy Concentrate

30 TABLETS Dietary Supplement

BLACKMORES
THE BEST OF HEALTH
www.blackmores.com.au

Consult a health care professional if symptoms persist

Figure 7. Magazine advertisement for Phytolife manufactured by Blackmores. The use of Asian symbolism can be seen in the chopsticks, serving plate and tatami matting background. The tofu is presented raw and unseasoned, possibly to appear bland and unappealing.



Soy-Start

Breakfast Cereal

The ideal way to start your day.

Soy Start is low in fat and high in fibre, both of which are recommended for good health.



PHYTOESTROGEN RICH - ISOFLAVONES & LIGNANS

Phytoestrogens are natural plant substances similar to the human hormone - oestrogen. Soy meal in addition to being a good source of quality protein is also an excellent source of phytoestrogens (**isoflavones**) as it contains most of the whole soy bean. This means that the phytoestrogens are in the same form as those found in nature and are not chemically altered. **Lignans**, found in high concentrations in linseed, also belong to the class of plant phytoestrogens.

The average Western diet provides about 5 mg per day of plant oestrogens whereas the average Middle Eastern diet contains about 20 mg and the average Asian diet contains between 20-100 mg of plant oestrogen. Population studies have found that diets high in phytoestrogens provide greater health benefits. Soy Start is a great way to increase the amount of plant oestrogens in your diet as one serve provides 65 mg of natural isoflavones.

FIBRE RICH

One serve (40g) provides 8.1 g of dietary fibre. A great start to achieving the 30 g daily amount recommended by health professionals for good health.

OMEGA 3

Linseed is a good source of the omega 3 essential fatty acid- Alpha-linolenic acid. From this the body can then make the same beneficial omega 3 fatty acids found in fish. Clinical studies have found that omega 3 fatty acids are valuable for good health.

VITAMIN E is an antioxidant vitamin and helps to mop up excess "free radicals" in the body.

For further information call our toll free Naturopathic Hotline on 1300 360 077.

Figure 8: Packaging for Soy-Start breakfast cereal. This was one of 2 food product packages identified which showed the amount of phytoestrogens present in the nutrition information.

Soy-Start and Vogel's Soy and Linseed Cereal are typical of the growing number of food products which mention the presence, or addition of phytoestrogens on their packaging (Fig 8). In the limited space most products give a brief definition of a phytoestrogen as a natural plant hormone similar to oestrogen, and mention that Asians eating soy rich diets enjoy the "health benefits".

Summary

Three phytoestrogen supplements were found on sale in Sydney. The supplement Promensil is the most representative of a phytoestrogen product because it contains a standardised dose of phytoestrogens. Phytoestrogens were found to be mentioned on the labels of at least 20 processed foods found in Woolworths supermarkets, mainly products that contained significant amounts of soy. Some packaging labels also included the quantities of phytoestrogens contained in the nutritional contents table.

A review of a promotional pamphlet for the predominant phytoestrogen supplement Promensil found that it used a blend of scientific information and natural imagery to suggest it is a natural product that has been made accessible through the scientific process. The main scientific argument for the value of the product focused on the inadequate inclusion of phytoestrogens in the Western diet, compared to other cultures who are supposedly better off during menopause. The advertisements for the soy based supplements also mention cultural based studies suggesting Asian people are benefiting from a diet rich in soy, a theme also found on much of the food packaging.

The women interviewed in this study knew some of these commercial products. Many of the impressions the women had of phytoestrogens did reflect views presented in some of the marketing activities. This was not the only means by which the women had learnt about the subject.

Public responses

How is the public responding to phytoestrogen information and what are the implications for public nutrition education? The information to answer this question was gained from the interviews with 12 women. The initial questioning, used to find suitable candidates to interview at the shopping centre basically asked 'have you heard of something called a phytoestrogen' The results were:

Yes — 23

No — 37

Thirty eight percent of the women had therefore heard of phytoestrogens. They were all between the ages of 41-60, the mean age bracket 51-55. Those that responded yes were asked what they thought it meant, if they did not already volunteer an explanation.

Seventy eight percent mention some connection with soy products. For example 'its something in soy that's meant to be good for us'. Responses by 30 percent of those who had heard of them also mentioned the idea that it was some sort of natural oestrogen, whether or not soy was mentioned. Thirteen percent of the responses were more vague 'some sort of health product'. From information uncovered in some of the in depth

interviews it is evident that the figures of awareness may be even higher in that people may be aware of some concepts, but not the specific terminology. Of the women interviewed in the two locations Table 1 shows some of the sources from which the women had heard about phytoestrogens.

Nutritional motivation

The interviews with the 12 women began with an assessment of their motivation to learn and practice good nutritional habits. Everyone interviewed claimed to have some interest in watching what they ate, but levels of interest appeared to differ among the interviewees. The subjects were asked directly what their level of interest in nutrition was, and indirect questioning such as challenges to their philosophy of either taking, or ignoring supplements, often provided revealing information about their knowledge and interests in the topic.

subject	Information sources
1	TV advertisement
2	pamphlet from health food shop, health food shop person
3	word of mouth, Promensil advertisement in chemist, menopause lecture
4	word of mouth, gynaecologist, Promensil pamphlet, chemist
5	public lecture, health food shop person

6	food packaging, did not know the word 'phytoestrogen'
7	Promensil pamphlet from doctors room
8	word of mouth, did not know the word 'phytoestrogen'
9	newspaper article, Promensil pamphlet from chemist
10	not sure
11	word of mouth
12	Book on menopause by Sandra Cabot

Table 1: Sources of phytoestrogen information for the subjects.

Two respondents did not know the term 'phytoestrogen' by name but were aware of dietary effects on oestrogen or 'natural oestrogens'.

First hand experience with negative health conditions, either with themselves or family members was identified as powerful motivational force to take an interest in nutrition. Examples ranged from mild colds to serious disease, which inspired the subjects to take actions on their nutrient intake. Subject (4) was a prodigious supplement taker and mentioned many examples of actively seeking nutrition information. When asked why she would describe herself as one so interested in nutrition, she said, "With a background like mine; my father died of coronary heart disease and my brother has diabetes, I would be crazy not to". Other interviewees did not mention such personal motivating forces, but illness was referred to in 5 cases as providing strong motivation to take an interest in eating 'healthy food' or taking dietary supplements, even in individuals who did not normally take them. For example four subjects reported taking vitamin C especially

when they were sick or felt run down.

Despite the motivational force of illness only one of the respondents held general practitioners in high regard as sources of nutritional information. One subject said she made a serious effort to have a healthy diet after visiting the GP although motivation was quickly lost. “I’ll probably eat better for a week after seeing him, before going back to my wicked ways”. Warning from doctors however, to watch cholesterol in either themselves or partners was noted in five cases, and was always teamed with the knowledge they must reduce fat intake.

The reported motivation for taking phytoestrogen supplements in the six women who were already doing so, appeared to mainly relate to the desire to find an alternative to hormone replacement therapy (HRT). Four women questioned what they perceived to be the medicinal orthodoxy of prescribing HRT.

“When my doctor first suggested I take HRT, it was clear it was his belief that everyone should be taking them, however I didn’t happen to agree on him on that one. So I was looking for an alternative.”

“I like the idea of a hormone replacement therapy that is not made from chemicals.”

“I think most doctors think its a normal thing to go on it, but I don’t just want to go on it, I need to have a good reason.”

Clearly delving into difficulties of choice in HRT was a sensitive issue to cover in public interviews, although it is obviously an area of dilemma for some women.

“It is a difficult field to understand, [HRT] There are so many factors. It’s a new field and not many people know because it hasn’t been working for so many years.”

Respondent (5), a nurse, said that she learns through social interaction that many women her age (46-50) “were going through various symptoms, some worse than others...and although I’m not menopausal yet, I’m hoping to fight it [HRT] off as long as possible with the Phytolife”

Food as a nutrient source

Avoiding negative components in food was almost a universal first response when asked, “what sort of things do you look out for in food” Ten of the interviewees mentioned the need to reduce salt and fat intake. Other negative components mentioned in foods were the ‘artificial’ ingredients: colourings, flavourings and preservatives. Two subjects were particularly worried about contaminants such as pesticides and one said she endeavoured to eat organic foods as much as possible or at times of “cleansing”. All of the interviewees gave some positive nutrition goals such as- ‘eat more natural foods’ or ‘include more fruit and vegetables’ and ‘eat a variety of things’. The desire to include more of the specific nutrients was mentioned by fewer of the women. Calcium was the most frequently mentioned, in 8 of the women and fibre in 6 subjects.

The most consistently mentioned connection between foods and the nutrient they contain

was the vitamin and minerals found in fruit and vegetables.

“They are a vitamin pill of the shelf, not from a bottle”

All of the subjects were aware supplements were not necessary, in theory, if they ate a good diet, but some had different views with the ease at which one could do this. One subject expressed concern over the difficulty of obtaining enough vitamins and minerals from fruit because of concerns over body weight and seasonal availability of fruit and vegetables she likes. Supplements were seen mainly as something to be taken when a need was detected, such as illness or feeling run down.

Subject (5) reported including taking an ‘ACE’ vitamin supplement sold as an antioxidant formulation, consisting of vitamins A, C and E, which have been implicated as cancer preventative. She tended to see supplements falling into the category of health maintenance, integral to maintaining a health diet.

When asked which foods contained phytoestrogens, soy was always the first food mentioned, and in two cases in its partnership with linseed. Clover was the second most mentioned source, but other than the various soy products few other foods were included. The most comprehensive answer came from subject (12) who had followed a diet in a book on natural hormone replacement. She mentioned alfalfa, various root vegetables and legumes.

Information gathering

Magazines were the most consistently mentioned source of information by the interviewees. Even those who said they were not avid readers of magazines were aware they contained many stories on diet and nutrition, from “picking one up now and then”.

The more active process of gaining nutrition information included borrowing books on the subject, consulting with personnel at health food stores and even studying short courses on nutrition. It appeared that the women who claimed to most actively seek nutrition information were those taking phytoestrogens supplements, with the exception of the nurse who suggested much of her knowledge came from a professional background.

One subject (10) found that books for kilojoule counting and other diet books provided additional nutrition tips that were useful. One woman also mentioned recipe books as a source of information. Alternative health practitioners such as naturopaths and homoeopaths were valued for nutrition information by two of the interviewees.

Most subjects agreed they found news stories about the latest nutritional research interesting, and many could recite specific recent findings.

“ Just the other day I heard that caffeine was good for you, because it stops the formation of gall stones.”

“...that’s the latest message I’m getting, folate in preventing Alzheimers. That’s very much in the fore in my mind at the moment”

“..the recent one is cheese isn’t as bad for you as they once said, because cheese unlike butter isn’t fermented.”

These stories seemed to be regarded more as curiosities than powerful recommendations to change diet and were more favourably recounted if they confirmed or supported pre-existing disposition. For example, if the person liked the food already or already believed it was good for them, the news story was integrated into their understanding . One woman had read bananas are high in potassium and used this to confirm the fact she loves bananas and always thought they were good for you anyway.

Discussion of the ‘latest’ research findings was almost invariably accompanied by some cynicism of the variability of such reports. Those who did not mention such conflicts in reported findings still reported, when prompted, noticing such variability in research and could produce examples. Many of the women used almost identical expressions to the effect that ‘one week they tell you this is good and the next they say it is bad for you.’

“first they tell you tea is bad for you because of the tannins now they say its good for you because it is an antioxidant”.

One woman expressed a similar observation not only in the 'latest' finding but with larger orthodox nutritional trends: "We have lived long enough to see things come full circle. What was popular twenty or thirty years ago is now not regarded as the optimum" .

When asked why they thought results varied so much, there was often scepticism about the motivation behind the research, and there was no mention of the limitations of the scientific methodology used in nutrition research.

"I suppose because different groups are pushing different flags. Lobbying different industrial lobby groups. The dairy industry would have their own lobby people who put out their claims and who hire different research people."

Another respondent who was a trained psychologist , had this to say:

"I'm aware that research is often paid for and directed by certain companies that stand to gain from the results. That is absolutely huge. So many people eat an appalling diet, but who is going to fund the research on these people? The chip companies aren't going to and the diabetic companies aren't going to because they get to sell insulin."

Two subjects reported hearing about phytoestrogens from lectures specifically dealing with menopause. One was held at the Royal North Shore Hospital, a large public hospital in Sydney. The other was a council-supported public talk, with invited doctors. It was not possible to ascertain if these events had any commercial sponsorship, but both these

attendees had a positive view of phytoestrogens. Both were taking phytoestrogen supplements, either Phytolife or Promensil, which they claim they encountered subsequently at either chemists or health food stores.

Word of mouth communication was mentioned as an important means of dealing with issues surrounding menopause, and all of the women who had heard about phytoestrogens said they had talked to friends about it.

Coping with a technical topic

When asked how they dealt with confusion in nutrition a common response was the “balance” approach and having a healthy diet. There was the belief that although there was a lot of conflicting and difficult advice, eating a variety would help “things even out in the wash”.

One woman had an interesting approach to the confusion of nutrient supplements. When she was aware of a substance she heard was ‘good’, she checked if that ingredient was listed in a product as a means of assessing if it was a useful supplement.

One of the more important ways the women dealt with the topic was with ‘common sense’ and self-evaluation. Several people claimed taking vitamin C for colds had ‘worked’ for them or that certain foods made them feel better or healthier. Although they found information about certain foods interesting, they were more likely to believe it after

testing it for themselves.

When asked what it meant when something was ‘healthy’ or ‘good for you’ some women stated good nutrition simply meant acquiring enough of the essential nutrients, or health food was simply something which replaced food that was bad for you, while others talked about noticeable changes or results, such as feeling better, having more energy and ‘vitality’. In these circumstances personal experience was cited as a good reference point, and noting what was right for ‘me’.

Phytoestrogens seemed to be assessed with a similar degree of self-experimentation. One respondent had not been happy with the outcome of her experimentation with a dietary approach to increasing phytoestrogen intake. She had attempted to follow a diet in a book which was designed to provide natural oestrogens. Maintaining the diet was difficult and it was not relieving symptoms as expected, so she opted for HRT. None of those who were taking phytoestrogen supplements could say that it was making them feel any different. “I don’t know how I would be feeling if I wasn’t taking it, but I am feeling pretty good at the moment. If it doesn’t kill you, and it might help you, why not take it”. No one seemed overly concerned about its safety, although one subject was interested in how it might interact with other supplements.

Specific scientific understanding of phytoestrogens

All the respondents who were familiar with the term ‘phytoestrogen’, equated it with a

‘natural’ form of oestrogens. The role of phytoestrogens in health were seen as supplementing falling oestrogen levels during menopause.

“This gynaecologist told me that the breakdown of oestrogens in the body is, in his opinion, not a natural or healthy thing, it’s a form of human deterioration, and if we can make some effort to make our quality of life better, do it”

Of the two women who had not heard the term “phytoestrogen”, one was aware of “natural oestrogens in soy milk”, the other “thought there was something in food which changed oestrogen levels”. Although there was no further questioning in understanding of the physiological action of oestrogen, clearly it was considered important for well being, and a familiar word to all the subjects.

“A woman of my age immediately pricks up her ears when she hears the oestrogen bit,”

Seven of the twelve subjects thought phytoestrogens might be useful partly based on the supposed lack of menopausal health problems found in Asian women.

“I have heard that in Asian countries like Japan there are no problems with menopause and that it’s because of the phytoestrogens”

Two of the subjects reported having even experienced this first hand.

“I have lived in Japan and I have seen the women; as they get older they don’t look as old

as we are, so early. So what there is in soy products and so on must be doing things”.

One subject reported her Korean friend insisted soy products were very healthy, but not specifically for menopause reasons.

Chapter 5: Discussion

Phytoestrogen science

The term 'phytoestrogen' is in some ways a restrictive label for quite a diverse spectrum of compounds, many of which are quite different to oestrogen in chemical structure. All have the common ability to bind with the oestrogen receptor. Many of the phytoestrogens can compete with oestrogen at these receptors, yet produce a weaker response (competitive antagonism). This helps support a hormone 'modulating' hypothesis for the possible benefits of these compounds (Kelly, 1997).

With the interest in isoflavone phytoestrogens turning to other non oestrogenic roles, (Barnes *et al*, 1996) it is interesting that the messages reaching the public is that they are a plant based replacement 'oestrogen'. The scientific findings are suggesting it is not possible to think of phytoestrogens in such simplistic terms.

Phytochemicals may work in combination with other each other, or other substances in the body. For example, the two main phytoestrogens so exalted in soy products represent more than 4000 flavonoids so far identified in a wide variety of plant foods.

The associations of particular dietary phytoestrogens with cancer prevention may never be further clarified because of the very long time it takes for the disease to develop, so the primary aspect the public may need to learn is how to evaluate the certainties and uncertainties of scientific risk association.

With some form of phytoestrogens found in nearly all plant based food, it seems science has at least provided one more mechanistic theory to support the belief that diets rich in vegetables are beneficial. It is inevitable that the scientific process needs to focus on specific chemicals in the search for equivocal answers. The isoflavone class of phytoestrogens has grabbed much of the attention, and soy with its high isoflavone content stands out as the most promising single food. Investigation of the role of soy food in a diet at least presents a whole plant product with much of its complexity intact.

The suggestions that, in the short term, soy or phytoestrogens can relieve menopausal symptoms appear less substantiated than the evidence for the prevention of chronic disease. A body of evidence for the lower incidences of many diseases in Asian populations was found in the literature review, but reports of menopausal symptoms in Asian countries were difficult to come by. This lack of information does not imply problems do not exist. Dr O'Neil, President of the Australian Menopause Society actually denies this notion, saying "Asian women do experience symptoms of menopause, it's just they are not treated" (Sharp, 1999). It is not acceptable in Japanese society for the women to report menopausal symptoms (personal communication, with Sharp). Cultural values, or sensitivities in this regard, could be influencing scientific reasoning. However, even if we were to assume Asian women suffered no menopausal problems, the role of life time exposure to these substances, or different genetic receptivity to these substances are important issues yet to be resolved. To attribute the entire health benefits of a cultural diet such as that of the Japanese, to a hand-full, (or pill full) of chemicals,

involves many untested variables, which only time and further clinical studies may identify.

How phytoestrogens are marketed

Commercial marketing of phytoestrogens in Australia is restricted by a company's aim to sell an appealing product and maintain acceptable TGA standards when presenting scientific evidence, which must also be comprehensible for the public. The majority of promotional material analysed in this study chose to focus on the oestrogen-like action of phytoestrogens. The description of soy on a Blackmore's advertisement "nature's hormone replacement therapy" was the most blatant statement. Claims about the reduction of hot flushes could be made on the evidence of some clinical trials but additional statements like the product increases 'well being and quality of life' are not scientific terms that specify empirical findings and can be made with impunity.

The universal inclusion in the advertisements of information about Asian populations 'enjoying the benefits' of diets rich in phytoestrogens is hardly surprising given the important role Asian epidemiological studies had in generating scientific interest in phytoestrogens. The presentation of epidemiological research presents an area of science that appears easily misunderstood by the general public, that is, the difference between association and cause and effect. The advertising seems to blur this distinctions through presentation styles and semantics. It is difficult for the advertisers of foods or listed complimentary medicines to use scientific figures, such as statistics on the prevalence of cancer because it would contravene TGA advertising guidelines on the disease. Phrases

like ‘Asian women have enjoyed the benefits...’ from Blackmore’s advertising material implies a definite cause and effect relationship, even though the effects – ‘benefits’ mean nothing in particular.

The Promensil pamphlet is distinct among many other information sources in that it mentions phytoestrogens are found in a variety of other foods, and suggests that dietary intake of legumes, not soy exclusively, is an important source of phytoestrogens for populations with ‘traditional’ diets. This may be in a bid to debunk soy products as the best source of phytoestrogens. In an interview for the Bulletin (Bagnall, 1998) Novogen’s company director was quoted as saying ‘our view is that the [isoflavone] story is probably being hijacked by soy’. Whether or not this is the reason, the message presented by this pamphlet is that a diet rich in legumes may be beneficial. From a nutrition education perspective this reinforces part of the ADG, which stresses eating a variety of grains and vegetables “including... legumes.” This information in Novogen’s advertising could be increasing awareness of dietary means of obtaining phytoestrogens, but it is certainly not encouraging it.

The word ‘Phytoestrogen’ is probably included on food packaging to differentiate products and can help to raise public awareness of the term, as was seen with some of the interviewees. The inclusion of phytoestrogens in the nutritional contents table may be providing an additional and misleading message. The very inclusion of an exact phytoestrogen content per serving suggests a specificity of knowledge about dietary doses or the importance of these compounds. There are as yet no official recommended dietary

levels for isoflavones or any phytoestrogens. These tables could facilitate people keeping a tally of their intake such as one woman in the interview group who had tried following a 'oestrogen diet' and who may be reflective of others trying this strategy.

Over all, commercial presentation did appear to act as an important part of the communication process. Advertising attached cultural values and other references to the scientific concepts and the products presented. The very existence of promotional materials for phytoestrogens creates messages in its own right. Some of the women interviewed noted the motives of advertising need to be treated with caution, so it is not surprising that no one said they chose to buy the product on the outright weight of advertising, and certainly not on the weight of the scientific evidence presented.

The information presented in the advertising material is only one aspect of the communication process between science and the public. The ability of the women interviewed to cope with the information in a day to day context encompasses a large range of factors. From of constructivist view point, much of the public's learning processes occurs from asking their own questions, and re-contextualising the knowledge into personally meaningful references. The information is comprehended in its overall context within the media 'viewing strip' and its place in each individual's domain of previous knowledge and experience.

Communication in context

The communication process from formal scientific discovery to the utilisation of that knowledge by the public is clearly not a linear process. The interviewees' understanding of science which they can use in their daily lives is not just the sum of information which 'filters through', to use a telecommunication metaphor of communication. It is possible to see the constructivist element to the subjects' learning process. One aspect of the communication between science and the public is the translation of the languages used in the different domains. The public can only construct meaning using their own vocabulary.

The words oestrogen and phytoestrogen could be considered jargon. Whether or not the public understands much of the scientific background of the word 'oestrogen' alone, it was a word familiar to all the women interviewed. 'Phytoestrogen' immediately suggests 'some sort of oestrogen' by its very name, which is exactly how the women in the interviews perceived it. I suggest this may in some way explain the rapid increase in awareness of these products despite much of the complexity involved in the science.

The finding that negatively perceived nutrients (eg. sugar, fat and salt) were more relevant to the interviewees' views on diet than nutrients judged more positively (such as vitamins and minerals) is a pattern found in other studies (Moorman, 1990). The study by Moorman suggests that negative consequence information, such as 'eating fat will cause heart attacks', is 'utilised' more effectively than positive.

Suffering through critical lack of any vitamin is something few Australians will ever see or experience. Over consumption is in fact a greater problem and much of the public nutrition promotion in Australia focuses on reducing people's intake of foods with 'negative' consequences (personal communication, Franklin, 1999).

In the Australian environment of over consumption and health warnings of the dangers of doing things wrong, phytoestrogens fit in well being marketed as preventing the occurrence of the negative symptoms of menopause. Women suffering from unpleasant menopausal symptoms, or hearing second accounts from friends could be expected to have a strong motivation to try these products or at least investigate them. The fact that TGA advertising regulations prevent claims saying that supplements can prevent cancer seem justified considering the powerful motivation such serious diseases could elucidate.

The fact that many of the interview subjects could recall the Asian studies may be due to the human or cultural aspect to the scientific research, which the women could relate to. All the women interviewed were Caucasian in appearance, and some aversions to soy products were noted, a condition reflecting their cultural background. Asian children grow up eating tofu, or other soy products, no questions asked. Quite clearly the Phytolife magazine advertisement in chapter 4 (Fig. 7) is pandering to such cultural cringe. The target demographic is likely to be women more fixed in their eating patterns, than younger generations of a more culturally integrated Australia. Two of the interviewees mentioned that their children were more accepting and enthusiastic of the taste of soy products compared to themselves even though they had greater personal

incentive to eat them. One woman's response neatly mirrored some of the marketing sentiment of Phytolife. "I don't really like soy milk and tofu which is why I decided to take the pill instead."

The scepticism found during the interviews about the nature of new scientific findings in nutrition did not act as barrier to some of the women from taking phytoestrogens. The interviews did suggest that in the field of health and nutrition, scientific rationale is not the only or primary factor in making a decision. The high degree of emotional and sensory involvement in choosing food or supplements suggests many of the decisions were ultimately intuitive, and made using 'common sense knowledge'. Common sense knowledge combines feelings, cultural values and facts. Such knowledge tends to be taken for granted and is heavily swayed by personal experience. This could be seen with the reported incidences of self discovery, for example, where a certain supplement had helped them to feel better in the past they were inclined to speak highly of its effectiveness. From a scientific viewpoint, experiments with a samples size of one, without any controls, do not hold much weight of evidence but such personal experience can provide compelling evidence for the individual.

All learning depends on communication and includes the asking of questions. When science fails to answer a question people look else where for the answers. Science, when viewed as a formal body of knowledge, learns by asking questions through experimentation, then communicating the results back and forth through the peer review process. Much of the information gained cannot be used to make meaningful judgements

outside of science. If, for example, a nutrition study finds that intake of a particular substance is strongly associated with a beneficial outcome, at what point of certainty is the public warranted in changing their behaviour? Science can't give definite answers to these questions. With adequate public awareness however, the public will start to ask its own questions, and come up with answers to act upon.

The women interviewed were not trained to use the raw results of scientific experiments. Instead they interpreted the information based on their perceived notions and existing personal knowledge. Upon hearing about scientific information about phytoestrogens the women did not communicate directly with other scientists or even use the frame-work of scientific reasoning. They were more likely to use other means of communication to balance the issues in their minds. Communication with an intermediary aided confidence in understanding. These people could be friends, family or a trusted 'specialist' such as a naturopath or doctor. Most of the women's nutrition knowledge appeared to be assimilated into their view of the world using terminology they were comfortable with. The different views of how to gauge what was "good for you" showed how the women created a workable understanding of the issues they were aware of. Personal investigation was one of the most highly regarded ways of coming to deal with information by the women.

The use of personal experimentation with various diets, not just phytoestrogen supplements, reported by many of the women showed an awareness of diet and health relationships. The findings reported by science add to the image of certain foods and may

be a trigger for the public to investigate the issues more thoroughly. This further investigation is likely to take on the form self testing and discussion with friends. The information from science forms a starting point to further investigation where there is a need to know. There appeared to be an awareness of the limitation of science even without the women having specific understanding of the reasons for conflicting findings in science. There is a growing awareness that other large frameworks of knowledge are available to deal with health concerns.

The use of alternative or herbal medicines is growing rapidly in Australia, with almost fifty percent of Australians reported to have used so called alternative medicines at least once (Drew and Myers, 1997). The growing popularity of herbal and traditional remedies is an area of sociology also under considerable investigation. Most herbal remedies are founded in traditional cultural knowledge. This traditional knowledge of herbal remedies is not recognised by pharmaceutical style testing.

Phytoestrogens have nuances as an alternative or 'herbal' style preparation, specially through the associations with red clover. Viewed as an 'alternative' to HRT by some of the women interviewed, the favourable response to phytoestrogens by naturopaths reported by three of the women could place this product in both 'orthodox' and 'traditional' medical camps. Although there is increasing evidence for a intermingling of practitioners in both areas traditional and orthodox medicines are often described by medical sociologists as very different paradigms of health care (Drew and Myers, 1997). This is undoubtably an aspect of phytoestrogens worthy of further investigation.

Recommendations for nutrition education

Phytoestrogen marketing may have limited impact over the larger population spectrum, considering advertisers are likely to be marketing to those better educated with high socio-economic status who already spend more money and attention on health care. The value of phytoestrogen supplements may still be questionable, but the evidence from the interviews certainly has implication for public health campaigners who may do well to use some of the techniques of companies which market supplements but without the same specificity of the health claims.

It is still too early yet to be recommending particular levels of phytoestrogen intake for the general public. If the existing public confusion regarding technical information on food in advertising is anything to go by, educators should continue to help the public to embrace and implement the generic recommendation of the ADG. Phytoestrogen research clearly re-emphasises the notion of eating a variety of fruit, vegetables and grains, especially legumes. Public health advocates in nutrition may wish to use the apparently successful techniques of using cultural health associations rather than biochemical ones. This technique could be used in promoting the benefits of the rather unglamorous legumes, or other fruit and vegetables

This study also illustrates some other cross-cultural problems in nutrition relevant to nutrition advocacy. The concept that western diets are now deficient in legumes,

compared to a diet prior to mass cultivation of cereal crops, illustrates some of the cultural factors that must be overcome. It is no use advising an increased intake of particular vegetables such as legumes if people cannot identify, cook, or enjoy them. In some cases it is just the passing of history that has made certain foods unfamiliar within ethnic populations.

Information about phytoestrogens could also be put to use in placing an even greater emphasis on variety of the fruits and vegetables people eat. Generic guidelines need to be supplied with additional references to give people more tangible means of working towards such goals. Examples of people taking food-grouping terms like 'vegetable' too generically were seen with people who don't have effective means of differentiating the types of vegetables and quantities they should consume. The ADG states that people should aim to eat a 'variety' of fruit and vegetables, but provides few workable guidelines how to do this. Research shows that darker and more pigmented vegetables are richer in flavonoids, like isoflavones. This could be translated into a simple and enjoyable health recommendation. I suggest, for example 'try to eat a wide colour range of fruit and vegetables'. Whether or not such a claim is justified on the health merits of flavones alone, it would provide another reference, non-threatening in its presentation of science, to guide the public.

Women are reported to make a greater effort in implementing healthy diets than men (Radimer and Harvey, 1995). Phytoestrogens have potentially as many health benefits for men as women. The way in which men react to the commercialisation of nutrients could

well be different considering men do have different patterns of acquiring health information. As with the woman's product Promensil, when advertising the male version the company Novogen targets a specific condition which it claims phytoestrogens may assist with, prostate 'disease.' Men with a need to know about prostate cancer (which cannot be used on public advertising) also have reason to come to terms with the science of phytoestrogens.

Limitations

This study only scraped the surface of the issues involved in the public perception of phytoestrogens. It could not make observations on how these nutrients relate to the general population's views of nutrition, rather the study identified potential issues. The interview sample was limited and could have benefited from a broader social field. The choice of an upper socio-economic interview group was assumed necessary to identify suitable candidates, who had some knowledge of phytoestrogens. A survey across the social spectrum would be necessary to determine if an awareness of the topic was in fact greater in upper socio-economic sectors.

The interviews were focused on nutrition or science based rationales behind food selection and was probably inappropriate for probing more intuitive decision making. A study could investigate decision-making processes at the time purchase, or use discussion groups to provide more candid information. The potential bias of the interviewer, with a background as a biochemist, was likely to be attuned to finding scientific and nutritional

rationales behind the subject's decision-making processes. The fact that this appeared to be only a fraction of the issues involved is a significant finding in itself.

The choice to investigate phytoestrogens as a nutritional topic uncovered some difficulties quite specific to this type of substance. The marketing of phytoestrogens is an area that blurs the topics of food and therapeutic products. The means by which consumers learn about everyday foods may be better studied separately from therapeutic products, which are investigated in response to specific ailments. There are marketing aspects of phytoestrogen supplements such as promotional materials supplied to doctors or other health care professionals, which were not covered by this study. The dilemmas involved in hormone replacement therapy are an area of communication that could warrant more investigation, and it is an area in which natural products are likely to play an increasing role.

Conclusion

The scientific concepts from this area of nutrition research have been presented to the public at a relatively early stage through the marketing of supplements. Advertising mainly presents phytoestrogens using the feature which identified them in the first place: their action as oestrogenic agonists. The advertising is focusing on women at, or approaching menopause. Many women wish to find an 'natural' alternative to HRT and are finding the promises of phytoestrogen advertising alluring. Some seem prepared to

allay scepticism of science to investigate the issue through their own means. Where there was a desire to find out more they were prepared to investigate and experiment for themselves. There seems little evidence that people saw an understanding of a more general health role.

It is inevitable in the profit driven economic climate that commercial interests will be the first to try and market the latest findings in nutrition, before science has conclusive evidence. Conclusive evidence is a difficult notion for nutritional science (and science in general) and the certainty implied in commercial marketing may be setting many people up to be disappointed or further disillusioned with such science.

It is fortunate the TGA guidelines prevent companies from making blatantly unethical claims like those made by nostrum sellers in the past, although it seems that suggestive messages are just as easily taken as fact. Current phytoestrogen supplements that contain doses similar to those in the diet are not likely to be harmful except to the wallet. Isolated nutrient supplements may become an important part of many people's health regimes in the future but it is questionable if this should come at the expense of people concentrating on dietary means of achieving the same or better results through eating a 'balanced' diet.

The scientific evidence suggests that to help people achieve a balanced diet, recommendations to the public must contain more emphasis on eating a variety of fruit and vegetables and whole grains. This study points out the importance of taking note of

cultural based food associations in nutrition education when communicating this message. Aiding people to come to terms with foods they may not be accustomed to eating by using culturally based scientific explanation may be an effective way of doing this.

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Appendices

Appendix 1. Australian Dietary Guidelines

As endorsed by the National Health and Medical Research Council, June 1992.

1. Enjoy a wide variety of nutritious foods.
2. Eat plenty of breads and cereals (preferably wholegrain), vegetables (including legumes), and fruits.
3. Eat a diet low in fat and, in particular, low in saturated fat.
4. Maintain a healthy body weight by balancing physical activity and food intake.
5. If you drink alcohol, limit your intake.
6. Eat only moderate amount of sugars and foods containing added sugars.
7. Choose low salt foods and use salt sparingly.
8. Encourage and support breastfeeding.

Guidelines on specific nutrients:

1. Eat foods containing calcium. This is particularly important for girls and women.
2. Eat foods containing iron. This is particularly important for girls, women, vegetarians and athletes.

Appendix 2. Sources of printed advertising material

Promensil information pamphlet produced by Novogen.

Available at product's point of sale or on request from the company

Better Homes and Gardens

Murdoch Magazines, Ultimo, NSW

Gardening Australia

Federal Publishing, Sydney, NSW

Health Body and Beauty

Murdoch Magazines, Ultimo, NSW

New Idea

Pacific Publications, McMahon's Point, NSW

Reader's Digest

Readers Digest, Sydney, NSW

Your Garden

Pacific Publications, McMahon's Point, NSW

Woman's Weekly

ACP, Sydney, NSW

Appendix 3. Retail outlets investigated

Annabel's Natural Food Store,

18 Willoughby Road, Crows Nest, NSW.

Crows Nest Pharmacy,

108 Willoughby Rd, Crows Nest, NSW

Dee Why Health Care Pharmacy,
852a Pittwater Rd, Dee Why, NSW

High Street Day and Night Pharmacy,
201 High St, Willoughby.

Kings Street Chemist,
293 King Street, Newtown NSW

North Ryde Amcal,
Cox's Rd Mall, Cox's Rd North Ryde NSW

Neutral Bay Pharmacy,
177 Military Rd, Neutral Bay, NSW

Roy Young Chemist, Chatswood,
level 4 Westfield Shoppingtown, Chatswood NSW

Soul Pattinson Chemist Northbridge,
165 Sailors Bay Rd, Northbridge, NSW

Russell's Natural Food Markets,

55 Glebe Point Road, Glebe, NSW

Russell's Natural Food Markets

Chastwood Westfield Shoppingtown, Chatswood

Soul Pattinson Chemist,

Shop 74, Macquarie Centre, North Ryde

Woolworth's Northbridge

Northbridge Plaza, Northbridge NSW

Appendix 4. Food with phytoestrogens on labelling

Food packaging which stated the product contains phytoestrogens.

Search conducted in Woolworths Northbridge Sailorsbay Road Sydney NSW

Type	Product name
bread	Vogel’s Soy Linseed Uncle Toby’s Soy & Linseed Molenberg Soy Linseed Moore’s Yeast-free Soy & Linseed Burgen High bake Soy & Linseed Burgen Soy-lin Original
breakfast cereals	Abundant Earth, Soy Start Lowans Whole Foods Multi Flakes Vogels Soy-Tana Vogels Soy Linseed Sanitarium Weet Bix-Hibran and Soy
soy drinks	Soy life Soy Milk Soy life Yogurt Soy life Custard

	So Natural Soy Drink
other	King Land Soy Cream Cheese Sanitarium Soy Health Soy Slices Sanitarium Soy Health Fillets Sanitarium Soy Health Sausages SoyCo Tofu

Appendix 5. Interview lead questions

Have you ever taken supplements, like vitamins and minerals?

Would describe yourself as someone who thinks about what your food contains?

Could you say what are some of the things you look out for?

How do you find useful information on nutrition?

Can you remember where you have heard about phytoestrogens?

What are some impressions you have of phytoestrogens?

(from the various sources)

Any ideas why phytoestrogens might be good for you?

Have you heard which foods naturally contain phytoestrogens?

Have you heard that some scientists think soy products are very good for you?

What does “good for you” mean to you?

What level science have you studied?

Appendix 6. Interviewees

Subject	Age	Occupation	Postcode	Science Level
1	51-55	retired	2113	primary
2	51-55	retail	2066	secondary
3	46-50	mother	2066	secondary
4	46-50	psychologist	2067	tertiary
5	51-55	nurse	2111	some tertiary

6	51-55	mother	2113	secondary
7	51-55	mother	2068	secondary
8	51-55	finance/retired	2088	secondary
9	51-55	nurse/retired	2088	secondary
10	46-50	mother	2089	secondary
11	51-55	mother	2063	secondary
12	51-55	physiotherapy	2088	tertiary

Appedix 7. Sample interview

Subject 4

Age 46-50

Profession: psychologist and ‘mum’

Have you ever taken supplements, like vitamins and minerals?

Yes, lots.

Can you say why?

I believe in them, and from what I’ve read there may be something worthwhile in taking them. At the moment I’m taking vitamin C, ACE, which is an antioxidant, iron, B6.

Would describe yourself as someone who thinks about what your food contains?

Yes definitely.

Why would you say that?

Because I’m aware that you are what you eat. The evidence show quite clearly that you can prevent cancers and, and fats are bad for your heart. With a back ground like mine, my father died of coronary heart disease and my brother has diabetes, I would be crazy not to. That’s a strong motivating force.

Could you say what are some of the things you look out for?

I avoid preservatives and additives and flavourings.

And what are the good things you try to include?

Definitely, fibre, calcium, that’s in yogurt . I try to buy and cook plenty of the leafy green vegetables.

Do you think about what it is in particular foods, like “this leafy vegetable has lots of vitamin A”

Yes, I do think like that a lot.

How do you find useful information on nutrition.

Read books, magazines, newspapers or TV, friends, nutritionist, Yoga teacher.

Like the other week I read in Time something about nutrition. Usually it is stuff we already know. Stuff we know we should be eating, but we don't want to know. It usually confirms what you already know from common sense, like we shouldn't eat too much meat, eat more fruit and vegetables.

I think you would find that its not common sense to everyone! you seem to know a lot about it. What do you think is wrong with meat?

It's got a lot of saturated fat which we all know is bad for us. Fish is better with the omega 3 oils.

Do you find it useful to talk to your doctor about these things?

Doctors, Not Gps. Sometimes when you go to a specialist like the endocrinologist or gynaecologist, you can ask what foods are high in calcium for example which I know I need.

Do you find any non traditional types of health practitioners useful, naturopaths etc?

I have been once to a naturopath and found a that extremely useful.

TV?.

I will see something on television now and then, but look, I think a lot of it is just common sense.

What do you mean by common sense? I'm interested in those words..

Its common sense that if you are eating just ice cream and potato chips you are not getting nutritionally very sound things. And the more vegetables and fruit you eat the better you

are. So, some of it just common sense.

There are many people who couldn't tell you these things.

Sure. We are on the whole just a very nutritionally aware family.

Can you remember where you have heard about phytoestrogens?

Exactly. My mother who was seventy went to a gynaecologist and he said what ever you do eat almonds because of the phytoestrogens. After that I thought no more of it.

A week later I met an endocrinologist who was really into research, I mean I think his name was, have you heard of him?

No.

So I asked him what's it about and he told me about the plant oestrogens. That was three years ago.

Have you noticed phytoestrogens popping up anywhere else since then?

Not really, I mainly speak about it with friends, or discuss it with the doctor and pick up a pamphlet there.

Have you noticed any food packaging which mentions phytoestrogens?

But I specifically buy the soy linseed bread and soy milk and tofu, because I know it contains these things.

Have you heard which other foods contain phytoestrogens?

Almonds, tofu, soy products.

So mainly the soy based foods?

Well they say Japanese women don't suffer many of these menopausal type symptoms because they eat a lot of soy.

Do you know where you heard this?

I read it some where. And my Korean friend always tells me how health miso soup is and soy products. And she even tells me how Korean miso, which tastes different to Japanese miso has been shown to be even healthier, so she told me this as well.

I have also noticed that Japanese and Koreans are very aware of the properties of their food.

Well in terms of food they know what is good for you and they know what is good for digestion. That's how they talk. And this is good if you are sick. Food is different to them

What are some impressions you have of phytoestrogens? Why do you think they might be good for you?

I actually have no idea. I think they mimic the qualities of the oestrogen in your body, and sort of add to what's there. And I think that is a good thing in my life at my age. I wouldn't see it as so essential for my kids although I like them to eat soy products, tofu and stuff like that. It's good also because its low in fat and has lots of protein, and instead of meat. I might add it to a stir fry to bulk it out. My Yoga teacher swears by it, she's into macro biotics. They believe very strongly in tempe. When you look at her you really can see that she looks different and better for it.

What does "good for you" mean to you?

I think long term it increases the probability of a good quality of life, not extremely long life, but high in quality. Makes life worthwhile.

How can you tell if something is good for you?

You can only go on what you read and work out from there use some common sense.

You do have to look where the research is done, if its sponsored by Blackmores or Roche.

What makes you choose supplements finding the nutrients in foods?

I don't know. I think it is often hard to get these things from eating fruits and vegetables. You have to eat a lot of them which would not be consistent with keeping thin, which is another priority. Also its balancing them all out. I like to be thin, and there is no way I could eat ten pieces of fruit a day and stay thin. So it balances out. And also fitting in what one like. For example I don't like apples, I wish I did, but I just don't like winter fruit, so again it helps to balance out. One tries all these things in the hope that somewhere you are doing the right thing. I'm sure if you ate a fantastic diet full of fruit and vegetables like my yoga teacher you wouldn't need to take these things. But I can't do these things. I don't want to eat spinach.

Are you aware of much conflict in the research about nutrition?

Yes and I'm also aware that the research is often paid for and directed by certain companies that stand to gain from certain results.. That is huge, absolutely huge. So many people eat an appalling diet. But who is going to fund the research on the people, the chip companies aren't going to , or the diabetic companies are not going to fund it because they get to sell insulin.

What level science have you studied?

I did some science at high school. And I studied psychology up to masters. None of it was nutritional, but I am very aware of how research works.